THE HISTORY OF FIREWORKS IN INDIA

BETWEEN A.D. 1400 AND 1900

By

P. K. GODE, M.A.

Transaction No. 17

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TRANSACTIONS

Many valuable lectures are given, papers read and discussed, and oral reviews of outstanding books presented, at the Indian Institute of Culture. Its day is still one of small beginnings, but wider dissemination of at least a few of these addresses and papers is obviously in the interest of the better intercultural understanding so important for world peace. Some of these are published in the Institute's monthly organ, *The Aryan Path*; then we have two series of occasional papers—Reprints from that journal, and Transactions. The Institute is not responsible for views expressed and does not necessarily concur in them.

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India's achievements of the mind and spirit need no brief for those familiar with her literary heritage, and who today is not?

That ancient India also had engineers of no mean ability is obvious from her temples and from her records of engineering feats, but the stereotype of an India disdainful of practical things is still widely accepted and needs to be broken. Several of our Transactions have borne witness to ancient Indian achievements in science and technology and in this scholarly paper, which was considered at a Discussion Meeting of the Indian Institute of Culture on March 19th, 1953. Prof. P. K. Gode establishes the fact that in the applied science of pyrotechny mediæval India not only did not lag behind Western countries in technical ingenuity and skill but even seems to have developed fireworks for displays on festive occasions before the middle of the 15th century.

Professor Gode has carried his study as far as the available data permitted and invites the attention of other scholars to the history of fireworks in India.

The author of this paper is one of the most prolific and meticulous of modern Indian scholars and critics. The range of his research and its volume are as remarkable as his careful scholarship, which has been widely recognized. The Bhandarkar Oriental Research Institute at Poona, of which Professor Gode is the Curator, recognized his services by bestowing on him its Silver Jubilee Award in 1943.

Instead of producing one or more authoritative volumes in a chosen field, Professor Gode has ranged widely in his investigations, serving future research workers by amassing a wealth of trustworthy data on many subjects, like those brought together in the present study, on which the scholars of tomorrow can confidently build.

A HISTORY OF FIREWORKS IN INDIA
BETWEEN A.D. 1400 AND 1900

All important inventions like printing, gunpowder, the mariner's compass, etc., have profoundly affected the course of civilizations of the East and the West. The history of the origins of these inventions and their wide-spread use throughout the world in the subsequent centuries is quite enchanting. Attempts have been made to study this history to the minutest detail on the strength of historical sources, both Eastern and Western. Unfortunately the Eastern sources are not easily available to European writers on this subject so naturally their accounts of inventions which originated in the East are incomplete and sometimes vague and erroneous. The articles on these inventions in the *Encyclopædia Britannica*, though very useful to the average reader, are incomplete, as I found when I referred to them during the course of my studies in the history of Indian culture. There is, therefore, ample scope for research pertaining to the history of these inventions on the basis of known and unknown Asiatic sources of history.

During the last 36 years of my close study and research in the field of Indian literary and cultural history, the history of some of the inventions which affected Indian culture excited my curiosity. Among these, the invention of gunpowder loomed large on the horizon of my field of investigation. Accordingly I published two papers,[1] recording the use of gunpowder in India for purposes of warfare. One of these papers deals with the history of the use of guns and gunpowder in India from *c.* A.D. 1400 onwards while the other deals with the history of the manufacture and use of firearms in India between A.D. 1450 and 1850. Copies of these papers were sent by me to numerous scholars in India and outside.

One of these scholars, *viz.*, the late Prof. Tenney L. Davis, Editor-in-Chief of *Chymia*, devoted to the history of chemistry and published by the University of Pennsylvania, pressed me to write one more paper on the related subject of the Indian contribution to the history of fireworks. When I received this request from this most versatile American scholar I decided to accept it, especially because I was collecting some material on this topic to complete my inquiry about the use of gunpowder in India, both for warfare and for entertainment. Unfortunately, Professor Davis is no longer with us to see the completion of the

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[1] *Vide* pp. 117-124 of the *Sir Denison Ross Commemoration Volume* edited by P. K. Gode and S. M. Katre, 1939, and pp. 208-228 of the *K. M. Munshi Diamond Jubilee Volume*, Part I (1948), published by the Bhāratīya Vidyā Bhavan, Bombay.

present paper, as he suddenly passed away in January 1950 after posting to me a batch of his papers on the history of Chinese alchemy and a proof of my paper on the history of ambergris in India, which appeared in Vol. II of *Chymia*, dedicated to his memory. The pleasant memory of my contact of two years with Professor Davis still haunts me as I write this paper.

In the article on "Fireworks" in the *Encyclopædia Britannica* (14th Edition, 1929, Vol. 9, pp. 281-283), no detailed history of fireworks is recorded. The following points in this article will, however, give us a background for the present study:—

(1) The history of pyrotechny may be said to have begun when a prehistoric fire maker first mixed saltpetre with his charcoal cooking-fire to use as tinder. Other ingredients were added later.

(2) When the principle of the gun was evolved by Berthold Schwartz in the 13th century the pyrotechnic mixture used by him was named "gunpowder."

(3) With the introduction of artillery the military fire worker came into existence. He provided pyrotechnic engines of war as also spectacular fireworks in celebration of victory or peace. During the 17th century and onwards, most occasions of national rejoicing were celebrated by displays of fireworks, generally provided by military fire workers.

(4) It was not until the early part of the 18th century that displays of any pyrotechnic merit were produced.

(5) During the 17th century two schools of pyrotechnic thought developed, *viz.*, (i) the Nuremberg school and (ii) the Italian school.

(6) The Peace of Aix-la-Chapelle in 1749 was celebrated in London with a display of fireworks.

(7) De Frezier in his two books published in 1707 and 1747 describes the introduction of colour in fireworks.

(8) In the first quarter of the 19th century the era of modern pyrotechny began with the introduction of potassium chlorate (discovered in 1788) in the manufacture of fireworks. Two metals, magnesium (*c.* 1865) and aluminium (in 1894) were introduced and gave to fireworks a brilliancy never before attained.

(9) The famous displays of fireworks at the Crystal Palace, London, were instituted in 1865.

(10) The National Peace Display in Hyde Park in 1919 was the greatest display produced up till that time.

(11) In the literature on fireworks the writings of the following authors are noted:—

(i) Vannucio Biringoccio (*Pirotechnia*, Venice, 1540 and 1553)
(ii) De Frezier (1707, 1747)
(iii) Ruggieri (1801, 1821)
(iv) Chertier (1843, 1854)
(v) Websky (Leipzig, 1878)
(vi) Denisse (1878)
(vii) A. St. H. Brock (1922)

These are the only points of historical interest in the article on "Fireworks" in the *Encyclopædia Britannica*. The earliest work on fireworks mentioned in the article is *Pyrotechnia* by Vannucio (1540). I shall record subsequently in this paper some formulæ in Sanskrit for the manufacture of fireworks by a royal author who flourished in Orissa between A.D. 1497 and 1539. This Indian author was evidently a contemporary of Vannucio who published his work on fireworks in 1540.

The *History of Fireworks* by Alan St. H. Brock (London, 1949) is a very important publication on the subject. Its first 10 chapters are of special interest to me as they deal with such topics as the origin of pyrotechny, pyrotechny in the East and in Europe (from early years to the 18th century) and pyrotechny from 1800 to 1948. The following points from this detailed history of fireworks will be found useful for understanding correctly the historical perspective in which my evidence on the history of fireworks in India must stand, in the light of our present knowledge of this subject:—

(1) The book contains some pictures of displays of fireworks and related exhibits of historical interest. I note below the details of some of these illustrations by dates:—

1570—Display at Nuremberg, the earliest print showing fireworks in action. (Plate I)
1600—Display at Florence in honour of the marriage of Henry IV of France. (Plate I)
1635—A printed book on fireworks by John Bate of London. (Plate II)
1650—Display at Nuremberg. (Plate III)
1678— do., in honour of the visit of Leopold, Emperor of Austria. (Plate IV)
1685—Display on the Thames for the Coronation of James II. (Plate VIII)
1676—Display at Versailles for 5 days. (Plate V)
1735—Display at Meudon on the 5th birthday of the Dauphin of France. (Plate VI)
1749—Displays at The Hague and at London to celebrate the Peace of Aix-la-Chapelle. (Plate facing p. 52)

1769—Ticket for ball and fireworks in commemoration of "Shakespeare's Jubilee" at Stratford-on-Avon, signed by George Garrick, brother of the famous actor. (Plate VII)

1763—Ticket for display to celebrate the Peace of Paris. (Plate VII)

1688—Display on the Thames to welcome William of Orange to London. (Plate IX)

1688—Display at Amsterdam to mark the Coronation of William in London. (Plate X)

1713—Peace Display on the Thames. (Plate XI)

1810—Display at Paris on the occasion of the marriage of the Emperor Napoleon to Marie Louise. (Plate XII)

1762—Illuminations at Buckingham Palace: Birthday of King George III. (Plate XII)

1751—Fireworks at Versailles: Contemporary water-colour bearing the signature of the pyrotechnist Torré. (Plate facing p. 81)

1814—Grand Jubilee Display at the Green Park. (Plate facing p. 96)

1816, 1820—Two posters about fireworks by Mr. Brock: This plate contains two pictures, of Queen Victoria's Coronation Display and of fireworks at Vauxhall Gardens. (Plate XIV)

1685 (6th November)—Act of 1685 Prohibiting the Manufacture, Sale and Firing of Fireworks. (Plate facing p. 140)

1855—Fireworks at Versailles celebrating the visit of Queen Victoria to Paris. (Plate XVIII)

1852—Display at Paris. (Plate XVIII)

1869—Display at the Crystal Palace: Visit of the Khedive of Egypt and De Lesseps, Engineer of the Suez Canal. (Plate XIX)

1892—Fire portrait of the Shah of Persia (60 ft. high) fired at the Crystal Palace. (Plate XIX)

1855—Fire works at Woolwich Marshes celebrating the fall of Sebastopol. (Plate XXIII)

1886—Display at Lisbon celebrating the marriage of the Crown Prince of Portugal. (Plate XXIV)

1892—"Niagara of Fire" from Brooklyn Bridge, New York. (Plate XXV)

1908—Display celebrating the Tercentenary of the founding of Quebec. (Plate XXV)

1919—Display at Hyde Park. (Plate XXVI)

1947—Display at Cape Town for the Royal Visit. (Plate XXVII)

1946—Rockets over the Thames: National Peace Display. (Plate XXVII)
1858—Explosion in Madame Coton's Factory. (Plate XXVIII)
1842—Explosion at D'Ernst's Factory. (Plate XXVIII)
1841—Rocket Practice at Woolwich Marshes: Picture showing Queen Victoria, the Duke of Wellington, etc. (Plate facing p. 224)
1673—Fireworks used for advertising by a quack doctor who died in this advertising stunt. (Plate XXIX)
1751-1772—*Diderot's Encyclopædia*: Plate showing Manufacture and Apparatus of Fireworks. (Plate XXX)

The foregoing dated illustrations about fireworks give us in a nutshell the history of fireworks in the West from A.D. 1570 onwards.

(2) Brock gives us a "Bibliography of Manuscripts and Printed Sources" in Appendix I to his *History of Fireworks* (pp. 267-270). I note below some items from this Bibliography:—

(i) Manuscripts by dates:—

A. D. 1432—MS. on the "*Feuerwerksbuch.*" (In the University Library, Freiburg.)

c. A. D. 1438—Latin MS. (In the Royal Library, Munich)

1785—*Artificial Fireworks:* 3 Volumes, with illustrations. (In Brock's possession)

(ii) Printed Sources.—Dates of printed works on Fireworks are as follows:—

1859, *1696* (London), 1816, *1529* (Strasbourg), 1817, *1591* (London), 1807, 1909, 1893, *1620* and *1630* (Pont-à-Mousson), 1818, 1825, 1635 (London), 1845, 1891, *1540* (Venice), *1578*, 1922, 1884, 1880, 1844, 1912, 1830, 1854, *c.* *1540* (Venice), 1823 (Philadelphia), 1822, 1825, 1943, 1882, 1876, *1579*, 1735, 1864, *c.* 1620, 1919, 1885, 1741, 1747, 1895, 1915, 1873, 1906, 1765, 1776, 1878, 1845, 1846, 1878, *1588* (London), *1607* (Strasbourg), *1629* (Paris), 1836, *c.* 1812, 1824, 1852, *1628* (London), *1643* (London), *1648* (Worcester), 1824, 1740, 1745, *c.* 1870, 1865, 1801, 1821, 1812, 1854, 1729, 1650 (Amsterdam), 1710, 1859, *1612* (Brussels), 1865, 1850, 1930 (New Orleans), 1947 (Brooklyn), 1900 (New York), *1573* (London), 1878, *1698* (Copenhagen), 1896.

Encyclopædias, Periodicals, etc.:—

1865, 1753 (*Chambers's Encyclopædia*); 1943, 1948, 1947, 1824, 1929, *1751-52* (*Diderot's Encyclopædia*), 1802, 1856, 1921, 1886, 1941.

Brock's *Bibliography* about fireworks gives us a fair idea how the invention of gunpowder has been exploited in Europe for purposes of warfare and

social entertainment. It is worth while preparing a bibliography of manuscripts and printed sources in India pertaining to gunpowder, firearms, fireworks, etc.

The Sanskrit texts on the manufacture of fireworks discovered by me belong to the period, A. D. 1497-1539. These texts appear to be the earliest, if not the only texts about the manufacture of specific fireworks, some of which have come down to us. In Brock's *Bibliography* the earliest MSS. about fireworks are dated A. D. 1432, 1438, etc., while the earliest printed books are dated A. D. 1529, 1540, etc.

(3) Speaking about the origin of pyrotechny Brock observes that the discovery of the possibilities of saltpetre as an aid to combustion, somewhere in Asia, led to the gradual development of pyrotechnic mixtures. The knowledge in course of time spread to Europe, where, early in the 14th century, the monk Berthold Schwartz invented the gun, adapting a pyrotechnic mixture to his purpose. Two hundred years later firearms were introduced into China by the Portuguese. (p. 19)

(4) The Chinese employed explosive missiles as early as A. D. 1232. "War rockets were used in India in very early times." There is no definite evidence as to when fireworks first began to play their part in Chinese civil life. (p. 20) Two works on pyrotechny written during the Ming Dynasty (A. D. 1368-1644) contain a few references to the subject, not of much practical value (p. 23). Chao Hsüehmin's *Outlines of Pyrotechnics* (*c.* A.D. 1753) seems to be the only work on civil fireworks to have appeared during the long history of pyrotechny in China. There are two books on Chinese military pyrotechnics written about the beginning of the 17th century.

(5) In A.D. 1659 a pyrotechnist named Kagia began manufacturing fireworks at Tokyo, in Japan. Since 1868 August 1, has been observed as the date of the great fireworks festival of Tokyo. (p. 26)

(6) Although primitive firework mixtures must have been known in India and used by the Hindus for many centuries it was not until almost the beginning of the present century that any advance was made. The cracker is used in India in differing forms known as *gola*, *pataka*, *vengagvedi*, *koroo*, *adirvedi* etc. "Chinese fire" mixture is used by Hindu pyrotechnists burnt in paper, bamboo containers and earthenware pots. These are known as *Tubri*. Other fireworks used in India are *anar*, *puljari*, *burusu*, *chandrajota* or *mahteb*. Rockets are known as *abusavanani* or *hawai* (p. 28).

Brock's history of fireworks is exhaustive so far as European sources are concerned but it contains no historical information about fireworks in Asiatic countries, including India.

Prof. L. Carrington Goodrich of Columbia University records some information about gunpowder and fireworks on pp. 152-154 of his *Short History of the Chinese People*, New York, 1951. The following points from these pages are noteworthy:—

(1) During the Sung Period (A. D. 960-1279) the application of explosive powder to war was a major development.

(2) The firecracker (known in the 6th century A. D.) was originally employed for religious ceremonies.

(3) Fiery projectiles were used in warfare as early as the 12th century.

(4) According to Chinese historians the process of making explosive powder was first described fully in a military handbook issued in A.D. 1044. The first trustworthy reference to the use of a mixture of *sulphur, saltpetre, paper, charcoal, tung oil*, etc., for military purposes dates from the year A.D. 1000.

(5) Full development of fire weapons is noticeable under the Mongols in the 13th and 14th centuries.

(6) In A. D. 1126-27 and in 1161-62 the Chinese utilized explosive weapons both on land and water against the invading Jurchen.

(7) In A. D. 1259 and 1272 the Chinese used such weapons as a long bamboo tube from which bullets were ejected by touching off the powder, to halt the advancing Mongols.

(8) The Mongols were fully equipped with fire-weapons, like a catapult capable of flinging large rocks and a field-piece called *mangonel*, constructed by two Moslems.

(9) Whoever may have invented the cannon and smaller pieces, the Chinese and their immediate neighbours played a significant part in the early stages of their development; the Chinese alone originated the firecracker and allied fireworks. [2]

In September 1948, I received from my friend Prof. Tenney L. Davis a reprint of an article on "Early Chinese Military Pyrotechnics," written by him in collaboration with Prof. James R. Ware of Harvard University and published in the *Journal of Chemical Education*, Vol. 24, pp. 522-537, November 1947. This article contains much valuable information about the history of pyrotechnics in China which is not known in India. The following points from this article supply us the Chinese background for the history of fireworks in India:—

[2] *Vide* "Invention and Use of Gunpowder and Firearms in China." By Wang Ling. (*Isis*, 1947, No. 37, pp. 160-178).

(1) According to Goodrich and Feng, guns were in use in China before the visit of Portuguese navigators to Canton in A. D. 1517, in fact, as early as A. D. 1236. Goodrich has published photographs of ancient Chinese iron cannons bearing the dates A. D. 1356, 1357 and 1377. The Peiping Museum contains copper cannons dating from the period of Hung-wu (A. D. 1368-1398) and others from the period A. D. 1403-1449. The Chinese had real firearms in the 13th century. In 1132 bamboo tubes were filled with a pyrotechnic composition and used for throwing flame. In A. D. 1259 bullets were loaded into tubes along with the composition and thrown out when it burned. In A. D. 1236, *p'ao* were cast from gold, silver, iron and bronze.

(2) From fireworks, firearms were undoubtedly derived.

(3) Among Chinese texts on military subjects the following dealing with military pyrotechnics are noteworthy as they contain many informative and interesting illustrations :—

(i) *Teng Tan Pi Chiu* by Wang Ming-hao (end of the 16th century), 23 illustrations.

(ii) *Wu Pei Chih* by Mao Yuan-i (about A. D. 1621), 222 single pages of pictures.

The contents of these treatises are examined at length by Davis and Ware with illustrations which supply us a complete picture of the various steps in the evolution of guns from spouting fire weapons. The fire weapons[3] described in these treatises are: (i) Arrows carrying an incendiary composition, (ii) Fire-balls, (iii) Incendiary stink bombs, (iv) Spouting fire weapons, (v) Rockets, (vi) Exploding weapons; Grenades, bombs and shells; (vii) Artillery and field pieces, and (viii) Guns.

(4) The following chronological table given by Davis and Ware gives at a glance the history of fireworks in China from the 6th century A.D. onwards :—

[3] We may compare the Chinese fire weapons with those used in India from 1400 onwards. See my paper in the *K. M. Munshi Volume*, Part I (1948) on the manufacture of firearms in India. In Akbar's time a body of gunners was kept on some vessels. (See *Ain-i-Akbari*, FRANCIS GLADWIN'S translation, Vol. I, p. 195. (Calcutta, 1897) Side by side with the bow and arrow, the bundook was also used for hunting. The *Ain-i-Akbari* refers to Akbar's "killing the lion with a matchlock." (*Ibid.*, p. 198)

Chronology A.D.	Item
6th century	Bamboos, cracking in a fire, used in Hupeh and Hunan to drive away malignant spirits. Firecrackers not yet known.
603-617	Emperor Yang-ti of the Suy Dynasty introduced fireworks, probably firecrackers.
618-906	T'ang Dynasty. Fang I-chih (*c.* 1630) believes that recreational fireworks, fire trees and silver flowers were already known. A certain Yüan Shu-chi, whose history is very much beclouded, mentions crackers, rockets, serpents or squibs, and exhibition pieces.
917	The Sovereign of Wu had a furious fiery oil for use in warfare.
968	Yo I-fang prepared fire arrows for the Sung Emperor.
1126	Fireballs thrown from catapults were used against the Kin in defence of K'ai-fêng Fu.
1132	An invention of Ch'ên Kuei, long bamboo tubes filled with a pyrotechnic composition used to rout bandits at Tê-an.
Before 1164	Wei Shêng used against the Kin fire stones made from saltpetre, sulphur, and willow charcoal and thrown from catapults.
1221	Kin Tartars attacked a Chinese city with *t'ieh-huo-p'ao*, gourd-shaped explosive bombs of cast iron, about two inches thick.
1232	Kin Tartars defending Lo-yang and K'ai-fêng Fu against the Mongols, employed "heaven-quaking thunderers" (explosive bombs) and "flying fire spears" (equipped with fire tubes).
1259	Chinese at Shou-Ch'un employed *t'u-huo-Ch'iang*, long bamboo tubes which threw smoke and fire and one or more bullets.
1272	Chang Shun had fire spears and fire ballistae on board boats at Siang-yang Fu.
1356 1357 1377	Cast-iron cannons of these dates exist in Chinese museums.
1368-1398 1403-1449	Copper cannons of these dates in the museum at Peiping.
1407	Emperor Yung-lo established a fire-weapon brigade. General Chang Fu, in his assault on Topang, used guns and bombs attached to animals.

I have given above the historical background of the origin and development of fireworks in China and Europe. It now remains for me to record my evidence about the use and manufacture of fireworks in India. I record this evidence below to enable other scholars to supplement it with new material from sources not known to me :—

(1) In the English translation of *Gulistan* by the Persian poet Sadi (*c.* A. D. 1175-1292) by Francis Gladwin. (Bombay, 1894, p. 133, Chapter VII —Tale XIII ("Effects of Education") we find the following :—

" An Indian was teaching others how to make fireworks, when a wise man said to him : 'This is not a fit play for you, who inhabit a house made of reeds. Until you are persuaded that the discourse is strictly proper speak not; and whatever you know will not obtain a favourable answer, ask not.' "

When I read this passage I thought that I had found the earliest reference to the manufacture of fireworks by Indians. Before accepting this reference as genuine, however, I wrote on December 5th, 1944, to my learned friend Khan Bahadur Prof. A. K. Shaikh, inquiring if Gladwin's translation of the lines containing the reference to fireworks was correct. In his prompt and scholarly reply to my letter Professor Shaikh wrote to me on December 7th, 1944, as follows :—

"Gladwin's translation of the passage in *Gulistan* is *wrong*. The correct translation is 'A Hindū (the word Hindu also means a Slave) was learning (*i.e.*, practising) *Naptha*-throwing' etc. The word used in *Gulistan* is *Naft* or *Nift* which is Arabic, from which are derived *Naphtha*, *Naphthaline*, etc. It was an inflammable liquid, with which thin glass bottles or balls were filled and these latter thrown against the enemy as incendiary bombs, somewhat like the modern hand-grenade. When struck, against any hard substances in the body of the enemy, the container would break and let loose the contents, which would immediately burst into flames and set fire to combustible articles. It was generally used in warfare in the middle ages.

"There are some works written in Persian bearing on the subject. Gunpowder is known in Persian and Urdu as *Bārūh* which is a Turkish word. Persian words relevant to Fireworks are :—हवाई, महताबी, अनार, आतशबाजी, दारूखाना. Other interesting Turkish words are :—बंदूक, बंदूकची, तमंचा, तोप, तोपची. दारू (Gunpowder) is also a Persian word."

In view of the above reply, I could not regard Sadi's as the earliest reference to the manufacture of fireworks by Indians.

(2) "Abdur Razzāq, the ambassador from the Court of Sultan Shāh Rukh, who stayed in Vijayanagar from the end of April A. D. 1443 till the 5th

of December A. D. 1443 during the reign of Devarāya II, mentions the use of pyrotechny in the Mahānavamī festival."[4] The words of this Persian Ambassador about pyrotechny are quoted by Dr. B. A. Saletore on p. 374 of his *Social and Political Life at Vijayanagar*, etc., (Vol. II) as follows:—

"One cannot without entering into great detail mention all the various kinds of pyrotechny and squibs and various other amusements which were exhibited."

It is clear from this reference that various kinds of fireworks, either manufactured at Vijayanagar or imported from outside, were used at Vijayanagar in A. D. 1443 and possibly many years earlier for purposes of entertainment at festivals.

(3) Ram Chandra Kak in his *Ancient Monuments of Kashmir* (London, 1933) gives the political history of Kashmir. In his account of the reign of Zain-ul-Abidin (A.D. 1421-1472), he refers to his work on fireworks as follows:—

Page 36—The King himself composed two works in Persian the first being a treatise in the form of questions and answers on the manufacture of fireworks and the second entitled *Shikayat* (The Plaint), a poem, etc.

Page 38—It was in his reign, in the year A. D. 1466 that firearms were first introduced in Kashmir.

It is curious to find that the Chinese text on military pyrotechnics by Wang Ming-hao, noticed by Davis and Ware in their paper referred to above, also belongs to the end of the 16th century. It remains to be investigated whether the Persian treatise on fireworks by the Kashmir Muslim King Zain-ul-Abidin had anything to do with the Chinese texts on military pyrotechny composed before A. D. 1472. I hope that some Persian scholar will throw some light on this point from Persian sources.

(4) Verthema in his *Travels* (Argonaut Press, London, 1928) writes about Malacca and Sumatra in Chapter XII. He was at Pidar (Pedir) in Sumatra. About the people of this place he observes on page 86 as follows:—

"They are also very great swimmers and excellent masters of the art of making fireworks."

The period of Verthema's *Travels* was "A. D. 1502-1508." It is, therefore, clear from his reference to fireworks in Sumatra that the art of making fireworks, which was in a flourishing condition in Vijayanagar in A. D. 1443 and current in Kashmir between A. D. 1421 and 1472, had also penetrated as far south as Sumatra and Malacca by A. D. 1500, if not earlier.

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[4] See Elliot's *History of India*, IV, pp. 117-18.

Verthema describes the City of Vijayanagar (Bisinegar), its elephants and elephant-fights (pp. 51-2). In this connection he observes (page 52) as follows:—

"But if at any time they (elephants) are bent on flight it is impossible to restrain them; for this race of people are great masters of the art of making fireworks and these animals have a great dread of fire, and through this means they sometimes take to flight."

The manufacture of fireworks at Vijayanagar and their display observed by Abdur Razzāq in A. D. 1443 had reached perfection by A. D. 1500 as vouched by the above remarks of Verthema.

(5) Barbosa in his *Travels*[5] (Vol. I, London, 1918, page 117) describes a Brahmin wedding in Gujarat and the use of rockets on this occasion as follows:—

"During this time they [the bride and the bridegroom] are entertained by the people with dances and songs, firing of bombs and rockets in plenty, for their pleasure."

It is evident from this reference to the use of fireworks by Barbosa in his *Travels* (A. D. 1518) that fireworks were manufactured in India on a large scale about A. D. 1500 and were available in plenty in Gujarat for use at marriages and on other festive occasions.

(6) The testimony of foreign observers as to the use and manufacture of fireworks in India between A.D. 1443 and 1518 recorded so far needs to be corroborated from Indian sources. So far, I have referred to only one treatise on fireworks in Persian, by Zain-ul-Abidin, the Muslim King of Kashmir (A.D. 1421-1472), but no Sanskrit text on the manufacture of fireworks had been discovered by any scholar. In search of such a text I was fortunate in discovering a section on the manufacture of specific fireworks in a Sanskrit work called the *Kautukacintāmaṇi*[6] by Gajapati Pratāparudradeva of Orissa (A. D.

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[5] Published by the Hakluyt Society, London. Second Series, No. XLIV, 1918.

[6] Aufrecht records the following MSS, of *Kautukacintāmaṇi* :—

C C I, p. 131[a]—कौतुकचिन्तामणि *dh* B. 3, 80 by Rudradeva K. 248.
कौतुकचिन्तामणि *med.* Oudh IX, 26. Burnell 696 by Pratāparudradeva. Bikaner 646.

C C II, p. 25[b]—कौ. चिन्तामणि An. Rgb 1031 (inc.) *med.* by Pratāparudradeva. I. O. 1957, 2072.

C C III, p. 28[b]—कौ. चिन्तामणि by Pratāparudradeva. Bd. 981.

1497-1539), the reputed author of some works on *dharmaśāstra* like the *Sarasvatī-vilāsa*, etc. Aufrecht mentions this royal author[7] of Orissa and the works attributed to him. None of the MSS. of the *Kautukacintāmaṇi* mentioned by Aufrecht in his Catalogue are available to me except the following, found in the Government MSS. Library at the Bhandarkar Oriental Research Institute, Poona :—

(1) *MS. No. 1031 of 1884-87*, Folios 52-55 of this MS. are devoted to विनोदनानि or royal entertainments. In fact, these folios contain formulas for the preparation of different fireworks such as :—

(i)	कल्पवृक्षबाणः	(v)	पुष्पवर्तिः
(ii)	चामरबाणः	(vi)	छुछुंदरीरसबाणः
(iii)	चंद्रज्योतिः	(vii)	तीक्ष्णनालः
(iv)	चंपाबाणः	(viii)	पुष्पबाणः

(2) *MS. No. 981 of 1887-91.* This MS. is dated A. D. 1778 but it is a copy of an earlier MS. dated A. D. 1670. Folios 37-38 of this MS. contain the formulas for fireworks (in Sanskrit verses) referred to above.

The text of the Sanskrit verses containing the formulas will be edited by me later by procuring copies of the MSS. of the *Kaututkacintāmaṇi* from other libraries. I may, however, note below the materials used in the manufacture of fireworks as found in the Sanskrit verses describing the formulas :—

(1) गंधकः—Sulphur. (*WPC*)[8]

(2) यवक्षारः—Saltpetre. (*WPC*)

(3) अंगारः—Charcoal. (*WPC* : charcoal of bamboo, pine, willow, birch-bark, etc.)

(4) तीक्ष्णस्य लोहस्य चूर्णं :—Powder of steel.

(5) लोहचूर्णं—Powder of iron. (*WPC* : Powder of roasted iron)

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[7] *Cata. Catalo.* I, p. 348—प्रतापरुद्रदेव गजपति, son of पुरुषोत्तमदेव, grandson of कपिलेश्वरदेव, patron of विश्वनाथसेन. Works attributed to him :
—कौतुकचिन्तामणि L. 3108, Bik. 646
—निर्णयसंग्रह
—प्रतापमार्तण्ड
—सरस्वतीविलास

[8] The letters *WPC* indicate the *Wu Pei Chih*, the Chinese text on military pyrotechnics by MAO YUAN-I, written about A. D. 1621. I have put the letters *WPC* against the materials used in Indian pyrotechnics to indicate that these materials were also used in China for the manufacture of fireworks.

(6) " ताम्रोद्भवं जांगलाख्यं द्रवं मरकतछवि:"—Exudation from copper called जांगल, having the lustre or colour of an emerald.

(7) तालकं—Yellow orpiment. (*WPC* : orpiment).

(8) यावान्यागैरिकं—गैरिक—Ochre. (Marathi काव, गेरू)

(9) खादिरं दारू—Wood of the *Khadira* tree.

(10) नालक or नाल—A hollow piece of bamboo.

(11) वर्तिका—A wick.

(12) पंचक्षार—Five kinds of salt. *Apte's Dictionary* mentions क्षारत्रितय —three kinds, *viz.*, natron, saltpetre, and borax.

(13) तीक्ष्णलोह—Steel.

(14) वेणुनाल—A hollow piece of bamboo.[9]

(15) आषुपाषाणमंत्र—आषुपाषाण=आखुपाषाण—Lodestone.

(16) चिन्नुकात्रय—

(17) एरंडबीजमज्जा or एरंडमज्जा—Pulp made of the crushed seeds of the castor-oil plant.

(18) सूतं—Quicksilver or mercury. (*WPC*)

(19) अन्नपिष्ट—Paste made from food (rice, etc.).

(20) वंशनाल—A hollow piece of bamboo.

(21) नाग—Tin or lead. (*WPC* : powder of lead)

(22) अर्कांगार (अर्क+अंगार)—Charcoal prepared from the wood of the अर्क (Madar, रुई) plant.

(23) गोमूत्र—Cow's urine.

(24) हिंगुलारस—हिंगुल—Vermillion or cinnabar. (*WPC*)

(25) हरितारक—This may be हरितालक or हरिताल—Yellow orpiment, (*WPC* : orpiment)

The foregoing list of ingredients of pyrotechnic mixtures used in India along with other accessories for the manufacture of fireworks *c.* A. D. 1500 speaks for itself. It is possible to suggest that the Chinese formulas for the manufacture of fireworks were brought to India some time about A. D. 1400 and then modified by the use of Indian substitutes for Chinese ingredients, not all of which may have been then available in India. The main pyrotechnic ingredients, like sulphur, saltpetre, charcoal, powder of iron, etc., had to be retained in the Indian formulas as they were the very basis of pyrotechny; they were available in India from early times.

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[9] Long bamboo tubes filled with a pyrotechnic composition were used to rout bandits in China. This was an invention of Chên Kuei (A. D. 1132).

(7) Consistent with my discovery of Sanskrit formulas about the manufacture of fireworks current in Orissa about A. D. 1500 and used for royal entertainment, I have found a brief description in Sanskrit of the display of fireworks for royal entertainment in a Sanskrit work, called the *Ākāśabhairava-Kalpa*, represented by a MS. in the Tanjore Manuscript Library. I acquired a copy of this voluminous treatise for the B. O. R. Institute and studied it. The results of my study of this treatise have been published by me in a paper[10] in the *Karnatak Historical Review* (Dharwar, 1939). This treatise contains references to guns and fireworks and is obviously later than *c.* A. D. 1400. In *Paṭala* 60 of this treatise नालिका (*nālikā*) or a gun is mentioned among 32 weapons to be worshipped by the King. In *Paṭala* 62, dealing with several entertainments (*vinodas*) for the King, I find the following passage describing a display of fireworks:—

ततः पश्येद्दारुयन्त्रविशेषान्स्यन्दना कृतीन् ।
दिवा भ्रान्त्या कल्पयतः केनचित्तेजसा निशि ॥
उच्चावचान् **बाणवृक्षान्** ततः पश्यज्जनेश्वरः ।
स्फुलिंगा**न्चामराकारान्** तिर्यगुद्गिरतो बहून् ॥
ततः प्रलयकालोद्यत् घनगर्जितभीषणम् ।
शृणुया**द्बाण**निनदं विनोदावधिसूचकम् ॥
एव प्रतिदिनं राजा विनोदान् पंचविशतिम् ।, etc.

In this passage the author gives us a description of the several structures used in the pyrotechnic display which the King was to witness each day. The expression "बाणवृक्षान्" (*bāṇavṛkṣān*)[11] possibly refers to structures on which the *bāṇas* or rockets were hung and from which they were fired off in the air. Sparks of fire were emitted from these structures and the whole display looked like the hairs of a Chowrie.[12] Some of the sparks issuing from these structures were shot off at a tangent. The entire display came to a close with the sound of a rocket (*bāṇa*), which was fired off last to indicate the end of the entertainment.

(8) From the references to fireworks in the Sanskrit sources recorded above I now turn to references to fireworks in Marathi literature. The earliest

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10 The title of this paper is "*Ākāśabhairava Kalpa*: An Unknown Source of the History of Vijayanagara."

11 This is possibly a display of the rocket called the कल्पवृक्षबाण described in the formulas of fireworks given by Gajapati Pratāparudradeva of Orissa.

12 Possibly the rocket called the चामरबाण in the formulas of Pratāparudradeva was used for this display.

description of a display of fireworks in a marriage procession so far discovered by me is found in Saint Ekanātha's Marathi poem *Rukmiṇī-Svayaṁvara* completed in Śaka 1492 = A. D. 1570. The text of this description is found on pages 106-7 of *Ekanāthacaritra* by Mr. D. B. Sahasrabuddhe (Poona, 1883). In describing the procession of the bridegroom's party on the occasion of the marriage of Rukmiṇi with Kṛṣṇa (Chapter 15 of the *Rukmiṇi-Svayaṁvara*) Ekanātha writes as follows:—

" भरूनि रजतम औषध ।
करूनि **अग्नियंत्र** संनद्ध ।
कृष्णापुढें अतिविनोद । एक प्रबुद्ध दाविती ॥ ११७ ॥
अग्नी लावुनी ठायीं ठायीं ।
ममता जाळिती **हवई** ।
गगना उसळली पाही । धुवोन ठायीं निमाली ॥ ११८ ॥
मोहयन्त्री **सुमनमाळा** ।
अग्निपुष्पें भासती डोळा ।
फुलें म्हणती अबला । पाहतां डोळा ते राख ॥ ११९ ॥
अतिलोभाची **चिचुंदरी** ।
अग्नि लावूनी टाकिली दूरी ।
पेटल्या पडती जनावरी । उरी शिरी जाळीत ॥ १२० ॥
देऊन उपशम अनळा ।
जाळीती क्रोधाचा **भुइनळा** ।
भडभडा निघति ज्वाळा । तोही तत्काळ निमाला ॥ १२१ ॥
हाती धरूनि कृष्णलीला ।
जाळिती कामाचा **हातनळा** ।
धरू नेणती त्या बरळा ।
जिवीं जिव्हाळा पोळती ॥ १२२ ॥" etc.

In *Ovis* 123 and 126 Ekanātha describes the display of बाण (rocket) and the variety of fireworks called चंद्रज्योती. The names of fireworks found in Ekanātha's description of fireworks are:—

(1) अग्नियंत्र—A small gun or rocket.
(2) हवई—A firework which rises up in the air with a stream of fire.
(3) सुमनमाळा—A firework producing garlands of fire flowers.
(4) चिचुंदरी—A rocket which goes with a hissing sound (PR)
(5) भुइनळा—A firework kept on the ground and emitting a stream of fire sparks.

(6) हातनळा—A firework held in the hand, and emitting a flow of fiery fire sparks.

(7) बाण—A rocket. (PR)

(8) चंद्रज्योती—A firework which emits fire, producing a moonlight effect. (PR)

In the above list of fireworks I have put the letters *PR* against those which are mentioned by Pratāparudradeva of Orissa in his formulas described in the *Kautukacintāmaṇi*. The names हवई, चिचुंदरी, भुइनळा, हातनळा, बाण and चंद्रज्योती are still current in the Deccan. These fireworks are still used in our marriage processions as they were used in Ekanātha's time, in the 16th century.

From the evidence recorded so far about the history of fireworks in India it is clear that by A. D. 1600 the use of fireworks for entertainment purposes had become current in Gujarat, Mahārāṣṭra, Orissa, Vijayanagar, and even Sumatra. The history of fireworks in other parts of India is worth investigating from other regional sources with which I am not familiar.

(9) Another Mahārāṣṭra author, Saint Rāmadāsa (A. D. 1608-1682) refers to guns and fireworks in his varied writings. So far I have traced the following references in the *Rāmadāsa Samagra Grantha* (Poona, 1906):—

Page 345—नित्यनैमित्तिक विधिसंग्रह सोपान, मानसपूजा, *Prakaraṇa* 13—This section deals with the description of a *bhajana* or devotional singing accompanied with the display of fireworks:—

" दिवट्या हिलाल चंद्रजोती ।
बाण, हवया झळकती ।
नळे, चिचुंद्रया धावती । चंचळत्वें ॥ ६ ॥
फुलबाजा, बंदुका, खजिने ।
पट्टे दांड भेदिती बाणें
अभिनव कीर्ती वाखाणे । भाट गर्जती ॥ १० ॥"

Page 588—युद्धकांड of *Rāmāyaṇa* in Śloka metre, *Prasaṅga* 13—A display of fireworks before King Rāma at night:—

निशी प्राप्त झाली असंभाव्य दाटी ।
बहू दीवट्या लक्ष कोट्यानुकोटी ।
किती एक ते उंच नेले उमाळे ।
नळे जाळितां घोष तैसे उफाळे ॥ ३२ ॥
सरारां फुलें धावती अंतराळी ।
कडाडीत घोषें निराळीं निराळीं ।

भुरारां **हवाया** किती एक वेळां ।
बळें पाहती ऊर्ध्वनक्षत्रमाळा ॥ ३३ ॥
बहू औषधें दिव्य नानापरींचीं ।
किती एक तेजाळ तीं कूसरीचीं ।
घडीनें घडी तेजपुंजाळ होती ।
उजेडेंचि ते लोक लोकां पहाती ॥ ३४ ॥"

This is a fine description of a display of illuminations and varied fireworks before King Rāma. As fireworks were unknown in the time of the *Rāmāyaṇa* in India and even in China it is an anachronism to insert any description of them in any story based on the *Rāmāyaṇa*. Being accustomed to displays of fireworks in his time, Saint Rāmadāsa could not but insert a description of them in his writings.

Page 621—Description of a festival on the completion of a Rāma temple at Chaphal (Satara District):—

"दिवट्या हिलाल **चंद्रज्योती** ।
नळे अरडत ऊठती ।
बाण हवाया झरकती । गगनामध्ये ॥ १३ ॥"

Page 623—Advice to King Shivaji on *Kṣātra-dharma* :—

"जैसा **भांड्यांचा गलोला** ।
निर्भय भारामध्यें पडिला ।
तैसा क्षत्री रिचवला । परसैन्यामध्यें ॥ ६ ॥"

The expression "भांड्यांचा गलोला" refers to the use of cannons (भांडीं) in warfare.

The names of fireworks referred to by Saint Rāmadāsa in the above extracts are as follows:—

(1) हवाया—plural of हवई, mentioned by *Ekanātha*.
(2) बाण—mentioned by *Pratāparudradeva* and *Ekanātha*.
(3) नळे—plural of नळा, mentioned by *Ekanātha*.
(4) चंद्रज्योती—mentioned by *Pratāparudradeva* and *Ekanātha*.
(5) नक्षत्रमाळा—compare सुमनमाळा mentioned by *Ekanātha*.
(6) चिचुंद्रया—plural चिचुंदरी mentioned by *Ekanātha* and *Pratāparudradeva*.
(7) फुलबाजा—compare पुष्पवर्ति mentioned by *Pratāparudradeva*.

Almost all the fireworks mentioned in Rāmadāsa's works in the 17th century are used today. Rāmadāsa also mentions भांडीं (cannons), बंदुका (muskets), and खजिने (small cannons or mortars with gunpowder used for producing thundering sounds during pyrotechnic displays).

(10) We have seen above that the term बाण (*bāṇa*) in the sense of a firework has been used by Pratāparudradeva of Orissa (*c.* A. D. 1500), by Ekanātha (A. D. 1570) and by Rāmadāsa (*c.* A. D. 1650), but we have no means of visualizing this firework. Bernier in his *Travels* (Constable, London, 1891) in India (A. D. 1656-1668) helps us to understand this contrivance known as *bāṇa*, which he calls " *bannes.*" The following extract from his *Travels* describes " *bannes* " and its use in contemporary warfare :—

Page 48—Speaking of the battle between the Emperor Aurangzeb and his brother Morad-Bakche, Bernier observes :—

" ...here and there were placed men who threw *bannes*, which are a sort of grenade attached to a stick and which were thrown, from various parts of the line among the enemy's cavalry, and which produced the effect of terrifying the horses and sometimes of killing the men. "

Page 277—Describing elephant-fights at festivals celebrated at Delhi and Agra, Bernier refers in the following extract to the use of a firework called *cherkys*, used for separating the fighting elephants :—

" ...The animals can be separated only by means of *cherkys*, or fireworks, which are made to explode between them ; for they are naturally timid, and have a particular dread of fire, which is the reason why elephants have been used with so very little advantage in armies since the use of firearms. The boldest come from Ceylon, but none are employed in war which have not been regularly trained, and accustomed for years in the discharge of muskets close to their heads, and the bursting of crackers between their legs. "

The firework called *cherkys* in the above extract is in use today in Northern India. It is called चरकी (*carkī*) in Bengal[13] and चरखी (*carkhī*) in the United Provinces[14] as reported to me by my friends Prof. D. C. Bhattacharya and Dr. V. S. Agrawala, to whom I am indebted for the information about fireworks which they have kindly supplied to me. It is worth while recording a complete glossary of the names of fireworks and allied terms now current in different provinces of India and Pakistan.

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[13] My friend Prof. D. C. Bhattacharya of Chinsura has sent to me a list of Bengali names of fireworks in which *carkī* is found. He derives this name from the Sanskrit *cakra*.

[14] My friend Dr. V. S. Agrawala has sent to me a list of fireworks manufactured at Lucknow (U. P.), among which I find no less than 9 varieties of *carkhi*.

(11) In the glossary of non-Sanskrit terms called the *Rājavyavahārakośa*, composed by Raghunātha Paṇḍita by order of the Maratha King Shivāji the Great about A. D. 1676, he explains the term बाण (*bāṇa*) as अग्निनलिका or a tube filled with gunpowder.[15] I think that "*bannes*" mentioned by Bernier, who was a contemporary of Raghunātha Paṇḍita, is identical with *bāṇa*. In the 67th *Paṭala* of the work *Ākāśabhairava Kalpa*, a description of the Divali festival is given. In this connection the King is advised to witness a display of fireworks (बाणविद्या) at nightfall along with tributary princes, etc. :—

" सामन्तराजपुत्रादीन् समाहूयाथ तैस्सह ।
निशामुखे **बाणविद्यां** हृद्यामालोक्य तत्परम् ॥ "

The Sanskrit word *bāṇa* means an arrow. *Bāṇa* in the sense of a rocket appears in Indian sources after *c*. A. D. 1400. This word appears to be a non-Sanskrit word. It is for linguists to trace its history and etymology in non-Sanskrit sources.

(12) Tavernier (A. D. 1676) in his *Travels in India* (London, 1889) refers to the use of fireworks in India and Java in the following extracts:—

Page 253. Describing marriage ceremonies in India Tavernier states that nuptials are celebrated with pomp and great expenditure. "He (the bridegroom) borrows moreover for this ceremony from the Governor of the place and from other great nobles as many elephants as he can, together with show horses and they march about thus for a part of the night with fireworks which are thrown in the streets and open spaces."

Page 360. While speaking about the King of Bantam at the western end of Java Tavernier observes:—

"There were five or six captains seated round the room who were looking at some fireworks which the Chinese had brought such as grenades, fusees, and other things of that kind to run on the water; for the Chinese surpass all the nations of the world in this respect."

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[15] See page 12 of *Rājavyavahārakośa*, Poona, 1880. The pertinent verses containing terminology about the use of gunpowder read as follows :—

शस्त्रवर्ग—" यन्त्रव्यूहस्त्वाराबास्याद्बाणोऽग्निनलिका भवेत् ॥ १२६ ॥
नालीकं **बरखंदाज** नलीयन्त्रं तु बन्दुखम् ॥
तोफ नाम भवेदुक्का **दारू** नामाग्निचूर्णकम् ॥ १३० ॥
लघुयन्त्रं **जबजंगं जम्बूरा** तु शतघ्निका ॥
दीप्तिनाडं भवेत् **काना गोलंदाज्** यन्त्रवेधकः ॥ १३१ ॥ "

(13) The Marathi poet Śrīdhara (died *c.* A.D. 1730) refers as follows to the firework called "*candrajyoti*" in his work "*Harivijaya,*" II, 129:—

"चंद्रज्योती चंद्राकार । तेजे अंबर प्रकाशे ॥" [16]

(14) In the *Peshwa Bakhar* by K. V. Sohoni, written towards the end of the Peshwa Period (edited by K. N. Sane, Poona, 1925, page 149), an account [17] of the Divali festival is given as follows:—

Mahādji Scindia (A. D. 1727-1794) informed Peshwa Savai Mādhavrāo (A. D. 1774-1795) as follows:—

"The Divāli festival is celebrated for four days at Koṭā (in Rājasthān), when lacs of lamps are lighted. The Rāja of Koṭā during these four days gives a display of fireworks outside the premises of his capital. It is called "दारूची लंका" or 'Laṅkā of fireworks.' During this display the image of Rāvaṇa is prepared and kept in the centre of the show. Images of *Rākṣasas,* monkeys and a big image of Hanumān are all prepared of gunpowder. The tail of Hanumān is then set on fire, and Hanumān begins to fly in the air setting fire to various houses in this Laṅkā of fireworks. Such a display is given by the Raja of Koṭā during the Divāli festival.

"The Peshwa ordered Mahādji to give a similar display of fireworks for his entertainment. Mahādji made all preparations within 15 days and the display was carried out on a dark night before the Peshwa and his Sardārs. The display took place at the foot of the Parvati Hill (near Poona) and was witnessed by the Peshwa and his Sardārs from the Parvati temple. It was a grand performance and was witnessed by the people of Poona in large numbers."

It appears from the above extract that displays of fireworks had become popular in Rajputana in the 18th century and that they were also used for royal entertainment on a grand scale.

(15) Rao Bahadur D. B. Parasnis published an article on "हिंदुस्थानांतील इंग्रजी आतषबाजी" (English Fireworks in India) in *Itihāsa-Saṁgraha,* Vol. I, No. 6, January 1909. Parasnis states:—

From the reign of Asafaddaula (A. D. 1775-1797), the Nawab of Lucknow, we find references to the attempts of the English to please Indian princes by their skill in the art of fireworks. About A. D. 1790, the English gave a remarkable display of fireworks at the court of the Nawab of Lucknow. A description

[16] See p. 38 of the Marathi *Śabdakośa* by Y. R. Date and C. G. Karve.

[17] I have referred to this account in my paper on the "History of Divāli Festival (Between *c.* A. D. 50 and 1945) published in the *Annals of the B. O. R. Institute,* Poona, Vol. XXVI, 1946, pp. 232-233.

of this display was sent to Nana Farnavis, the Chief Minister of the Peshwa at Poona, by his Vakil at Lucknow. This description is very interesting.

Parasnis has reproduced the entire letter of the Vakil in Marathi giving a detailed description of the display of fireworks at Lucknow. I give below a brief summary of this letter :—

An English artist of the name of "Karār,"[18] expert in the art of fireworks, came to Calcutta. He gave displays of his skill in fireworks to the English at Calcutta and thus attained prominence. He was also properly rewarded by the English for his skill. The reputation of this artist spread far and wide in India. Two English officers at Lucknow of the names of "Iḍor" and "Alpu" wrote to the English at Calcutta to send the artist to Lucknow. The artist accordingly came to Lucknow and for six months he was busy preparing different fireworks. When the fireworks were ready "Iḍor" and "Alpu" arranged for their display with Mirza Amānī Hasanrajākhān and Haidarbeg Khān and Raja Mangatrao on a cloudless evening at their residence at Bibipur.

The English artist "Karār" made his fireworks ready. On a square pillar he placed a statue of fireworks and asked the persons assembled to shoot it with their guns with a view to starting the display of fireworks. Some Englishmen as well as Raja Javānsing and Mirza Amānī tried to shoot at the statue several times but missed their aim. As it was getting late the artist "Karār" with his own hand set fire to one of the fireworks to start the whole display. Immediately other fireworks caught fire and produced a veritable garden with fire flowers of orange, green and other colours. This display was quite spectacular and lasted for a time. Thereafter a column of fire blazed forth from a rocket and went high up in the sky and there split up into countless stars which, while falling down on the earth, were transformed into hooded serpents. Other fireworks blazed forth and went up in the sky and produced hundreds of fish, which fell down on earth like stars. Just at this time began the rainfall-like display of fireworks. From another firework arose a mosque. To heighten the pleasure of this unprecedented sight the spectators heard, high in the air, great noises of the firing of muskets and guns. These noises were so great that they were heard at Lucknow proper, though they were produced at Bibipur. As the display was coming to a close there arose from the blazing fire of a rocket a Sun of fire, which moved up high in the sky and illumined the whole *maidān* below. A similar display of the moon followed from a rocket. To close this display the artist produced a sun-like fire flower which went on

[18] This artist "Karār" needs to be identified. The names "Karār," "Iḍor" and "Alpu" are queer transformations of English names.

whirling in the sky producing bright letters which could be seen distinctly and read by the spectators.

Thus came to an end this marvellous display of fireworks by the English artist " Karār," who was richly honoured and rewarded by the Nawabs present. All the spectators thanked the English for this excellent entertainment. The people then dispersed and went to their homes.

The display of fireworks about A.D. 1790 given by an English artist Karār before the Nawabs of Lucknow is important for the present history of fireworks of India. So far I have not discovered any evidence about such displays by European artists prior to A. D. 1790, before Indian spectators.

(16) In the *Hobson-Jobson* by Yule and Burnell (Edition of 1903, London, pp. 208-209) many dated references to the Divāli festival are recorded from A. D. 1613 to 1883. Among these references the following one contains a description of the Divāli illuminations accompanied with fireworks :—

A. D. 1820. The *Dewalee, Deepaulle* or Timē of Lights takes place 20 days after the *Dussera* and lasts three days ; during which there is feasting, illumination and fireworks. (T. Coats in *Tr. Lit. Soc. Bo.* ii, 211).

(17) The second marriage of Sayaji Rao II of Baroda was celebrated in A. D. 1820 with the use of fireworks costing about Rs. 3,000/-, as vouched by the following document in *Historical Selections* (Baroda Records) edited by C. V. Joshi. (Vol. VII, 1943, p 925)

Letter No. 33, dated 23rd April 1820—Memo to Haribhakti for Rs. 18500/-. Out of this sum an amount of Rs. 3000/- was to be used for the preparation of fireworks :—

" ३,००० अतसबाजी दारू करावयासी"

(18) Buchanan in his *Patna-Gaya Report,* published by the Behar Research Society, Patna (Vol. II, pp. 625-626) records the following remarks about the manufacturers of fireworks in Bihar about A. D. 1811 :—

" Those who make fireworks are not superior to the *Atushbaz* usual in Bengal. The fireworks are chiefly employed at marriages. At other seasons the same people make gunpowder of which a good deal is used. The nations seem to delight in the noise of firearms and fire powder merely for pastime but many people in this district are constantly provided with arms and ammunition ; as a defence against robbers or rather from family habits, considering themselves as born soldiers. They do not, however, parade in arms and few of them now appear in public with even swords. "

(19) Edward Moor in his *Narrative* (of Operations against Tipu Sultan) London, 1794, gives a description of a rocket on p. 509 from Major Dirom's *Glossary*.

(20) In the *Ājñāpatra* of Rāmacandra Nīlakaṇṭha Amātya (edited by Urdhwareshe) there are several references to *Bāṇa* (rocket). This document is dated A. D. 1716.

(21) A small booklet called "दीपवाळी बहार" or "अग्निक्रीडा" by Lakṣmaṇa Pāmjī Khopkar (Bombay, Anglo-Vernacular Press), 18°6 records the methods of manufacturing different fireworks for Divāli celebrations. The materials mentioned in this booklet are :—

(1) सोरा (सुर्याखार)—
(2) गंधक—Sulphur,
(3) कोळसा—Coal of शेर, तूर, आघाडा, देवदार, एरंड, मिरची, निवडुंग.
(4) बीड—
(5) मनशीळ—
(6) हरताळ—
(7) कापूर—Camphor.
(8) गुळी—
(9) सुरमा—Antimony.

Fireworks for which formulas are given in the booklet are :—

(1) नळे—(मोतिया, चमेली, शेवंती, आनार, सुरू, बैठकी)
(2) फुलबाजी
(3) चन्द्रज्योत (white, red, green)
(4) सुरसुऱ्या
(5) बाण
(6) बत्त्या
(7) आवाजाची दारू
(8) बंदुकीची दारू
(9) सफेत तारे
(10) लाल तारे
(11) चिचुंद्रि

Many of the ingredients for the manufacture of fireworks mentioned in the above booklet are also found in the Sanskrit formulas for fireworks (*c.* A. D. 1500) recorded in the *Kautukacintāmaṇi* by Gajapati Pratāparudradeva of Orissa already referred to by me.

(22) An article on the manufacture of fireworks for Divali celebrations has been published in the Marathi magazine *Udyama* of Nagpur for October 1936, pp. 666-668. The fireworks mentioned in this article are :—

(1) आतषबाजी (white, blue, red, purple, green)
(2) टिकल्या
(3) फुलझडी
(4) फुलबाज्या
(5) भुईनळे
(6) चंद्रज्योती

(23) The modern Marathi poet Keśavasuta refers to fireworks in one of his poems as follows :—

" मोठे बाण ही चन्द्रज्योती मधुनी त्या फूलबाज्या नळे "—केक १४१

(See p. 1808 of *Śabdakośa* by Date and Karve)

(24) The following Marathi printed books about fireworks have been kindly brought to my notice by my friend Shri C. G. Karve[19] :—

(1) अग्निक्रीडा by Gaṇeśa Bābāji Māṭe (Litho Press, 1871).
(2) अग्निचमत्कार by Govinda Morobā Karlekar (Litho Press, 2nd edition, 1889).
(3) अग्निक्रीडा by Raṅganātha Sakhārāma Lāṭe (1894).
(4) आतषबाजी by Śaṁkara Yajñeśvara Garge (1927).

Information about fireworks has been given in such Marathi works as " हुन्नरकलासंग्रह. " " उपयुक्तकलासंग्रह, " " उपयुक्तकलाकलाप, " " विविधकलाशतक, " etc.

(25) Shri V. K. Bhave in his recent book called " पेशवेकालीन महाराष्ट्र, " Poona, pages 362-63, makes some remarks on the आतषबाजी or fireworks in use during the Peshwa Period and in particular during the reign of Peshwa Savai Mādhavarāo. The names of fireworks given in these remarks are :—

(1) तावदानी रोषनाई	(8) बाण
(2) आकाशमंडळ तारांगण	(9) पाणकोंबडी
(3) चादरी दारूकाम	(10) हातनळे
(4) नारळी झाडें	(11) कोठ्याचे नळे
(5) प्रभाचमक	(12) फुलबाज्या
(6) कैचीची झाडें	(13) महताफा
(7) बादलगर्ज	

[19] I am thankful to Shri Karve for the trouble taken by him in searching for printed Marathi writings on fireworks.

In concluding my notes on the history of fireworks in India I have to request other scholars to supplement them with additional evidence from datable sources. In the present paper I have recorded my evidence about the history of fireworks in India and provided it with the background of the history of fireworks in China and Europe as recorded by other scholars. I shall welcome evidence about the use and manufacture of fireworks in India prior to A D. 1400 from any source, Indian or foreign. I want in particular evidence on the following points connected with this problem :—

(1) What person or persons brought the knowledge of fireworks to India ?

(2) What is the exact chronology of the transmission of fireworks to India ?

(3) Is there any evidence in Chinese, Persian or Arabic sources about the introduction of fireworks in India ?

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